

EMAT publications FY 2014

Ali Javey, lead PI

Category A – primarily driven by EMAT FWP

1. "Surface Hole Accumulation and Fermi level stabilization energy in SnTe", Junichi Nishitani, Douglas Detert, Jeffrey Beeman, [Kin Man Yu](#), [Wladek Walukiewicz](#), *Appl. Phys. Express* vol. 7, p. 091201, **2014**. DOI: 10.7567/APEX.7.091201.
2. "Elastic Properties of Chemical-Vapor-Deposited Monolayer MoS₂, WS₂, and Their Bilayer Heterostructures", Kai Liu, Qimin Yan, Michelle Chen, Wen Fan, Yinghui Sun, Joonki Suh, Deyi Fu, Sangwook Lee, Jian Zhou, Sefaattin Tongay, Jie Ji, [Jeffrey B. Neaton](#), [Junqiao Wu](#), *NanoLett.*, vol. 14, p. 5097, **2014**. DOI: 10.1021/nl501793a.
3. "Strain-Induced Indirect to Direct Bandgap Transition in Multilayer WSe₂", S. B. Desai, G. Seol, J. S. Kang, H. Fang, C. Battaglia, R. Kapadia, [J. W. Ager](#), J. Guo, and [A. Javey](#), *Nano Letters*, vol. 14(8), p. 4592–4597, **2014**. DOI: 10.1021/nl501638a.
4. S. V. Novikov, M. Ting, [K. M. Yu](#), W. L. Sarney, R. W. Martin, S. P. Svensson, [W. Walukiewicz](#) and C. T. Foxon, "Tellurium n-type doping of highly mismatched amorphous GaNAs alloys by plasma-assisted molecular beam epitaxy," *J. Cryst. Growth*, vol. 404, p. 9-13, **2014**. DOI: 10.1016/j.jcrysGro.2014.06.042
5. "Fermi level stabilization and band edge energies in Cd_xZn_{1-x}O Alloys", D. M. Detert, K. Tom, C. Battaglia, J. Denlinger, S. H. M. Lim, [A. Javey](#), A. Anders, [O. D. Dubon](#), [K. M. Yu](#), and [W. Walukiewicz](#), *J. Appl. Phys.* vol. 115, p. 233708, **2014**. DOI: 10.1063/1.4884683.
6. "Air-stable surface charge transfer doping of MoS₂ by benzyl viologen ", D. Kiriya, M. Tosun, P. Zhao, J. S. Kang, [A. Javey](#), *Journal of the American Chemical Society*, vol. 136 (22), p. 7853–7856, **2014**. DOI: 10.1021/ja5033327.
7. "Field-Effect Transistors Built from All Two-Dimensional Material Components", T. Roy, M. Tosun, J. S. Kang, A. B. Sachid, S. B. Desai, M. Hettick, C. C. Hu, and [A. Javey](#), *ACS Nano*, vol. 8(6), p. 6259–6264, **2014**. DOI: 10.1021/nn501723y.
8. "Electronic Band Structure of GaN_xP_yAs_{1-y-x} Highly Mismatched Alloys: Suitability for Intermediate Band Solar Cells", R. Kudrawiec, A. Luce, M. Gladysiewicz, Y. J. Kuang (邝彦瑾), [K.-M. Yu](#), C.W. Tu, and [W. Walukiewicz](#), *Phys. Rev. Applied* vol. 1, p. 034007, **2014**. DOI: 10.1103/PhysRevApplied.1.034007.
9. "Strong interlayer coupling in van der Waals heterostructures built from single-layer chalcogenides", H. Fang, C Battaglia, C. Carraro, S. Nemsak, B. Ozdol, J. S. Kang, H. A. Bechtel, S. B. Desai, F. Kronast, A. A. Unal, G. Conti, C. Conlon, G. K. Palsson, [M. C. Martin](#), [A. M. Minor](#), [C. S. Fadley](#), [E. Yablonovitch](#), R. Maboudian, [A. Javey](#), *Proceedings of the National Academy of Sciences (PNAS)*, vol. 111(17), p. 6198-6202, **2014**. DOI: 10.1073/pnas.1405435111.
10. "High Gain Inverters Based on WSe₂ Complementary Field-Effect Transistors", M. Tosun, S. Chuang, H. Fang, A. B. Sachid, M. Hettick, Y. Lin, Y. Zeng, [A. Javey](#), *ACS Nano*, vol. 8(5), p. 4948–4953, **2014**. DOI: 10.1021/nn5009929.

11. "Silicon heterojunction solar cell with passivated hole selective MoO_x contact", Corsin Battaglia, Silvia Martín de Nicolás, Stefaan De Wolf, Xingtian Yin, Maxwell Zheng, Christophe Ballif and [Ali Javey](#), *Applied Physics Letters*, vol.104, p. 113902, **2014**. DOI: 10.1063/1.4868880.
12. "Fermi-level stabilization in topological insulators Bi₂Se₃ and Bi₂Te₃: origin of the surface electron gas", JoonkiSuh, Deyi Fu, Xinyu Liu, J. K. Fudyna, [Kin Man Yu](#), [WladyslawWalukiewicz](#), and Junqiao Wu, *Phys. Rev. B* vol. 89, p. 115307, **2014**. DOI: 10.1103/PhysRevB.89.115307.
13. "MoS₂ P-type Transistors and Diodes Enabled by High WorkfunctionMoO_x Contacts", S. Chuang, C. Battaglia, A. Azcatl, S. McDonnell, J. S. Kang, X. Yin, M. Tosun, R. Kapadia, H. Fang, R. M. Wallace, [A. Javey](#), *Nano Letters*, vol. 14(3), p. 1337–1342, **2014**. DOI: 10.1021/nl4043505.
14. "Self-consistent mean-field theory of size distribution narrowing during ramped temperature ion beam synthesis", J. P. Mastandrea, M. P. Sherburne, C. N. Boswell-Koller, C. A. Sawyer, J. Guzman, K. C. Bustillo, J. W. Ager, E. E. Haller and D. C. Chrzan, *J. Appl. Phys.* vol. **114**, p. 234301, **2013**. DOI: [10.1063/1.4846737](#).
15. "Interfacial free energies determined from binary embedded alloy nanocluster geometry", C. N. Boswell-Koller, S. J. Shin, J. Guzman, M. P. Sherburne, K. C. Bustillo, C. A. Sawyer, J. P. Mastandrea, J. W. Beeman, [J. W. Ager](#), [E. E. Haller](#) and [D. C. Chrzan](#), *APL Materials* vol. **1**, p. 052105, **2013**. doi: 10.1063/1.4828937.
16. "Modeling of the Atomic Structure and Electronic Properties of Amorphous GaN_{1-x}As_x", E. BakirKandemir and B. Gonui, G.T. Barkema, [K. M. Yu](#), [W. Walukiewicz](#) and L. W. Wang, *Computational Materials Science* vol. 82, p.100, **2013**. DOI: 10.1016/j.commatsci.2013.09.039
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Category B – collaborations

1. "Ultrafast Charge Transfer in Atomically Thin MoS₂/WS₂ Heterostructures", Xiaoping Hong, Jonghwan Kim, Sufei Shi, Chenhao Jin, Yinghui Sun, Sefaattin Tongay, Yu Zhang, [Junqiao Wu](#), Yanfeng Zhang, [Feng Wang](#), *Nature Nanotech.*, vol. 9, p. 682, **2014**. DOI:10.1038/nnano.2014.167.
2. "High Bi content GaSbBi alloys", M. K. Rajpalke, W. M. Linhart, M. Birkett, K. M. Yu, J. Alaria, T. S. Jones, M. J. Ashwin, and T. D. Veal, *J. Appl. Phys.* vol. 116, p. 043511, **2014**. DOI: 10.1063/1.4891217.
3. "Band Anticrossing in ZnOSe Highly Mismatched Alloy", M. Welna, R. Kudrawiec, Y. Nabetani and W. Walukiewicz, *Appl. Phys. Express*, vol. 7, p. 071202, **2014**. DOI: 10.7567/APEX.7.071202.

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4. "Improved ion implant fluence uniformity in hydrogen enhanced glow discharge plasma immersion ion implantation into silicon", J. Luo, L. H. Li, H. T. Liu, [K. M. Yu](#), Y. Xu, X. J. Zuo, P. Z. Zhu, Y. F. Ma, Ricky K. Y. Fu, and Paul K. Chu, *Rev. Sci. Instrum.* vol. 85, p. 063506, **2014**. DOI: 10.1063/1.4875982.
 - I. Acknowledgement: The works were jointly supported by National Natural Science Foundation of China (11075012 and 11275020) and Hong Kong Research Grants Council (RGC) General Research Funds (GRF) No. CityU 112510. Work performed at LBNL was supported by the Director, Office of Science, Office of Basic Energy Sciences, Materials Sciences and Engineering Division, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.
5. "Theoretical Prediction of Magnetism in C-doped TlBr", Yuzhi Zhou, [E. E. Haller](#) and [D. C. Chrzan](#), *Physical Review B* vol. 89, p. 195201, **2014**. DOI: 10.1103/PhysRevB.89.195201.
 - I. Acknowledgement: This work was supported by the U.S. Department of Homeland Security under Grant Award No. 2009-DN-077-ARI-026-04 and by the Director, Office of Science, Office of Basic Energy Sciences, Division of Materials Sciences and Engineering, of the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.
6. "Facile Synthesis of [Cu(SR)]. Nanowires with High Charge Mobility," Yuliang Zhang, Ting Xia, [Kin Man Yu](#), Fuhua Zhang, Heng Yang, Boyang Liu, Yan An, Yansheng Yin, Xiaobo Chen, *ChemPlusChem* vol. 79, p. 559-563, **2014**. DOI: 10.1002/cplu.201300415.
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7. "Substitutionality of nitrogen atom and formation of nitrogen complexes and point defects in GaPN", H. Jussila, K. M. Yu, J. Kujala, F. Tuomisto, S. Nagarajan, J. Lemettinen, T. Huhtio, T.O. Tuomi, H. Lipsanen, and M. Sopanen, *J. Phys. D: Appl. Phys.* vol. 47, p. 075106, **2014**. DOI: 10.1088/0022-3727/47/7/075106.
8. "Photoactuators and motors based on carbon nanotubes with selective chirality distributions", X. Zhang, Z. Yu, C. Wang, D. Zarrouk, J.-W. T. Seo, J. C. Cheng, A. D.

- Buchan, K. Takei, Y. Zhao, [J. W. Ager](#), J. Zhang, M. Hettick, M. C. Hersam, A. P. Pisano, R. S. Fearing and [A. Javey](#), *Nature Communications* vol. 5, p. 2983, **2014**. DOI: 10.1038/ncomms3983.
9. "Photoreflectance of the temperature dependence of the band gap of $\text{GaSb}_{1-x}\text{Bi}_x$ alloys with $0 < x \leq 0.042$ ", J. Kopaczek, R. Kudrawiec, W. M. Linhart, M. K. Rajpalke, [K. M. Yu](#), T. S. Jones, M. J. Ashwin, J. Misiewicz, and T. D. Veal, *Appl. Phys Lett.* vol. 103, p. 261907, **2013**. DOI: 10.1063/1.4858967.
 10. "Powerful, Multifunctional Torsional Micro Muscles Activated by Phase Transition", Kai Liu, Chun Cheng, Joonki Suh, Robert Tang-Kong, Deyi Fu, Sangwook Lee, Jian Zhou, Leon O. Chua, [Junqiao Wu](#), *Adv. Mater.* vol. 26, p. 1746, **2014**. DOI: 10.1002/adma.201304064.
 11. "Work Function Engineering of CVD Graphene by Atomic scale Defects Generated with alpha-beam Irradiation", Jong-Hun Kim, Jinheui Hwang, Joonki Suh, Sefaattin Tongay, Sangku Kwon, C. C. Hwang, [Junqiao Wu](#), and Jeong Young Park, *Appl. Phys. Lett.*, vol. 03, p. 171604, **2013**. DOI: 10.1063/1.4826642.
 12. "Photogenerated current by two-step photon excitation in ZnTeO Intermediate Band Solar Cells", Tooru Tanaka, Masaki Miyabara, Yasuhiro Nagao, Katsuhiko Saito, Qixin Guo, Mitsuhiro Nishio, [Kin M. Yu](#), [Wladek Walukiewicz](#), *IEEE J. Photovoltaics* vol. 4(1), p. 196, **2014**. DOI: 10.1109/JPHOTOV.2013.2282738.
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 13. "Single crystalline $\text{In}_x\text{Ga}_{1-x}\text{N}$ layers on germanium by molecular beam epitaxy", R.R. Lieten, W.-J. Tseng, [K.M. Yu](#), W. Van de Graaf, J.-P. Locquet, *Cryst. Eng. Comm.* vol. 15, p. 9121, **2013**. DOI: 10.1039/C3CE41483C.
 14. "Growth and properties of GaSbBi alloys", M. K. Rajpalke, W. M. Linhart, M. Birkett, [K. M. Yu](#), D. O. Scanlon, J. Buckeridge, T. S. Jones, M. J. Ashwin, and T. D. Veal, *Appl. Phys. Lett.* vol. 103, p. 142106, **2013**. DOI: 10.1063/1.4824077.